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(72) Inventor: Talja, Martti  
35800 Mänttä (FI)

(74) Representative: Kaukonen, Juha Veikko  
Kolster Oy Ab,  
Iso Roobertinkatu 23  
00120 Helsinki (FI)

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(71) Applicant: Metsä-Serla Oyj  
02100 Espoo (FI)

## (54) Method and apparatus for making patterned paper

(57) A method and apparatus for making patterned paper. A printer (10, 10') patterning the paper is arranged in a patterning unit (4) arranged in a paper machine (1). The printer (10, 10') patterning a paper web (3)

being made in the paper machine (1). The printer (10, 10') is preferably an ink-jet printer. The paper web (3) patterned by the patterning unit (4) can be coated by a coating unit (5) arranged in the paper machine (1).

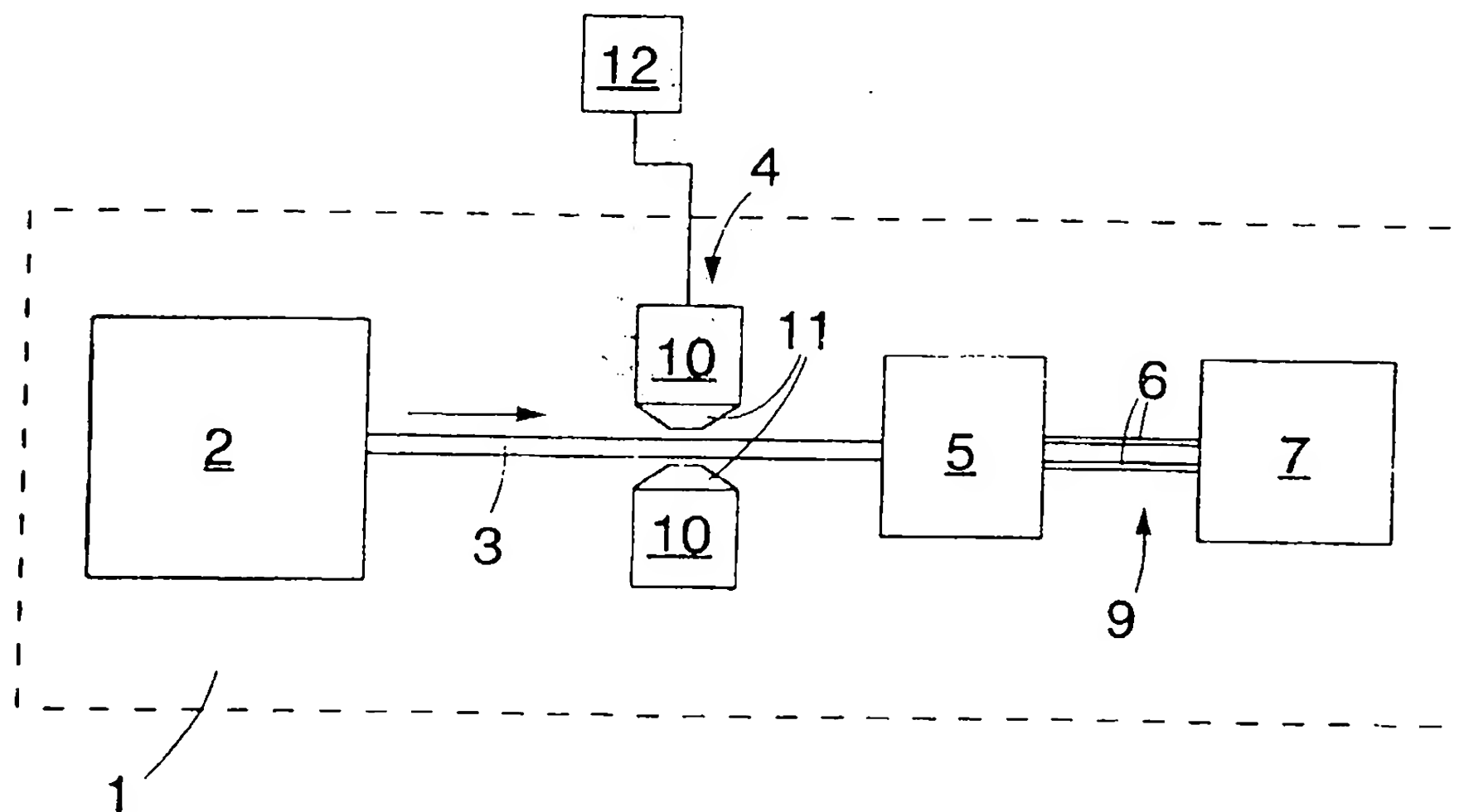


FIG. 1

## Description

[0001] The invention relates to a method for making patterned paper, in which method the paper is made in a paper machine and patterned

[0002] The invention further relates to an apparatus for making patterned paper, which apparatus comprises a paper machine and a patterning means for paper.

[0003] Some paper grades are patterned with various patterns before the paper is delivered to its user. The patterns may be used for aesthetic purposes, for communicating necessary information - in the packaging, for instance - or for some other purpose. In this application, patterning refers to both text and images

[0004] In prior art, paper is patterned in a separate work phase. For instance, patterned baking paper is made by first making the paper in a paper machine, and then transferring the paper to a separate patterning unit in which patterning is typically done by printing. In a third phase, the paper is siliconized, i.e. coated with silicone which gives the paper the good detaching properties typical of baking paper. Patterning must be done prior to siliconizing so as to have the colour stick permanently to the paper. The manufacturing process thus comprises three phases which are all done with different machines and possibly in different factories or even in different localities, and between the phases, the paper rolls need to be moved and stored. The manufacturing process in its entirety is, therefore, expensive and complex as it is time-consuming and requires several different machines and work phases. In addition, changing the patterns for the paper is time-consuming, and consequently, the patterning of small batches of paper with special patterns, for instance, is not economically profitable.

[0005] It is an object of the present invention to provide a method and an apparatus for making patterned paper, in which the above-mentioned drawbacks do not exist

[0006] The method of the invention is characterized in that a patterning unit is arranged in a paper machine, and a printer belonging to said patterning unit patterns the paper web being made in said paper machine.

[0007] An apparatus of the invention is characterized in that the patterning means comprises a printer arranged to the patterning unit arranged in the paper machine, and that the printer is arranged to pattern the paper web being made in said paper machine

[0008] The essential idea of the invention is that a patterning unit is arranged in a paper machine making the paper to be patterned, and the patterning unit patterns desired patterns in to the paper web running in the paper machine. Further, the idea of a preferred embodiment is that the patterning unit comprises one or more printers, whereby the rate of patterning or complexity of patterns can be increased. The idea of another preferred embodiment is that the printer is preferably an ink-jet printer which comprises one or more printing heads,

thus making the patterning especially easy. The idea of a third preferred embodiment is that a coating unit is arranged in the paper machine after the patterning unit in the direction of travel of the paper web, and the already patterned paper web is coated at the same time with making and patterning it. The idea of a fourth preferred embodiment is that the patterned and coated paper is a siliconized baking paper.

[0009] The invention provides the advantage that paper patterning is performed at the same time and in the same apparatus as paper making, whereby making patterned paper becomes fast. The paper need not be transferred away from the paper machine for patterning, thus avoiding transporting, storing and other extra intermediate phases, which reduces considerably the manufacturing costs and lead time of patterned paper. Even complex patterns can easily and simply be patterned on the paper, and the patterns can be changed and altered even during patterning through a control program of the patterning unit. Further, a preferred embodiment provides the advantage that by coating the patterned paper immediately after the patterning by means of a coating unit arranged in the paper machine, it is possible to further reduce transport and storage costs and speed up the manufacturing process. In addition, by immediate coating, the patterns are right away covered under the coating and cannot wear or otherwise deteriorate before delivery to the customer.

[0010] The invention will be described in greater detail by means of the attached drawings in which

Figure 1 is a greatly simplified schematic of an embodiment of the apparatus of the invention from the side.

Figure 2 is a schematic of the embodiment of the invention shown in Figure 1 from the top, and

Figure 3 is a schematic of a second embodiment of the apparatus of the invention from the top.

[0011] Figure 1 is a greatly simplified schematic of an embodiment of the apparatus of the invention from the side. A paper machine 1 making paper to be patterned is shown by a dashed line in the figure. The paper machine 1 is known per se to a person skilled in the art and consequently, it is not described in detail herein. Further, the operation of the paper machine 1 is known per se to a person skilled in the art and, therefore, need not be described in detail herein. The paper machine 1 comprises means for forming and drying a paper web, in other words, a forward end, a press section and a dryer section, which means are marked by reference number 2 in Figure 1. The paper web 3, whose direction of travel is shown with an arrow in Figure 1, coming from the forming and drying means 2, is led to a patterning unit 4. The patterning unit 4 comprises a printer 10 whose printing head 11 prints the desired patterns onto the paper web 3. The printer 10 may comprise one or more printing heads 11 whose imprints may also be of various

one-coloured. It is naturally possible to have more or less than three printers 10' arranged consecutively in the patterning unit 4'.

[0019] The control unit 12 of the patterning unit 4' is arranged in the paper machine 1, preferably together with the control and monitoring units of the paper machine 1 known per se, whereby the process of making patterned paper can, in its entirety, be controlled and monitored from the same control room.

[0020] The drawings and the description related to them is only intended to illustrate the idea of the invention. The invention may vary in detail within the scope of the claims. Thus, the patterning unit may comprise printers arranged both side by side and consecutively. In addition, the printers may be arranged suitably interlocked with each other. There may be more than one patterning unit arranged in the paper machine which further speeds up the patterning of extremely complex patterns, for instance.

#### Claims

1. A method for making patterned paper, in which method the paper is made in a paper machine (1) and patterned **characterized** in that a patterning unit (4) is arranged in the paper machine (1), a printer (10, 10') of which patterning unit (4) patterns the paper web (3) being made in said paper machine (1).
2. A method as claimed in claim 1, **characterized** in that the patterning unit (4) comprises at least two printers (10, 10').
3. A method as claimed in claim 1 or 2, **characterized** in that at least two patterning units (4) are arranged in the paper machine (1).
4. A method as claimed in any one of the preceding claims, **characterized** in that at least one printer (10, 10') is an ink-jet printer comprising one or more printing heads (11).
5. A method as claimed in any one of the preceding claims, **characterized** in that the paper machine (1) comprises a coating unit (5), to which the paper web (3) patterned in the patterning unit (4) is led and in which the patterned paper web (3) is coated on at least one side with a coating layer (6).
6. A method as claimed in claim 5, **characterized** in that the paper web (3) is made into baking paper which is then siliconized.
7. A method as claimed in any one of the preceding claims, **characterized** in that some of the printers (10, 10') pattern the top side of the paper web (3)

and some of the printers (10, 10') the bottom side of the paper web (3).

8. A method as claimed in any one of the preceding claims, **characterized** in that the patterning unit (4) patterns the paper web (3) with patterns (8, 13) which continuously repeat as such.
9. A method as claimed in any one of claims 1 to 7, **characterized** in that the patterning unit (4) patterns varying patterns on the paper web (3).
10. An apparatus for making patterned paper, which apparatus comprises a paper machine (1) and a patterning means for paper, **characterized** in that the patterning means is a printer (10, 10') arranged as a patterning unit (4) arranged in the paper machine (1), and that the printer (10, 10') is arranged to pattern a paper web (3) being made in said paper machine (1).
11. An apparatus as claimed in claim 10, **characterized** in that the patterning unit (4) comprises at least two printers (10, 10').
12. An apparatus as claimed in claim 10 or 11, **characterized** in that at least two patterning units (4) are arranged in the paper machine (1).
13. An apparatus as claimed in any one of claims 10 to 12, **characterized** in that at least one printer (10, 10') is an ink-jet printer comprising one or more printing heads (11).
14. An apparatus as claimed in any one of claims 10 to 13, **characterized** in that the paper machine (1) comprises a coating unit (5) arranged after the patterning unit (4) in the direction of travel of the web (3), the coating unit being arranged to coat the already patterned paper web (3) on at least one side.
15. An apparatus as claimed in any one of claims 10 to 14, **characterized** in that the paper machine (1) is arranged to make baking paper.
16. An apparatus as claimed in any one of claims 10 to 15, **characterized** in that at least some of the printers (10, 10') of the patterning unit (4) are arranged side by side in the lateral direction of the paper web (3).
17. An apparatus as claimed in any one of claims 10 to 16, **characterized** in that at least some of the printers (10, 10') of the patterning unit (4) are arranged consecutively in the direction of travel of the paper web (3).
18. An apparatus as claimed in any one of claims 10 to

17. **characterized** in that the printing heads (11) of the printers (10, 10') are one-colour printing heads
19. An apparatus as claimed in any one of claims 10 to 17. **characterized** in that the printing heads (11) of the printers (10, 10') are multicolour printing heads. 5
20. An apparatus as claimed in any one of claims 10 to 19. **characterized** in that some of the printers (10, 10') are arranged to pattern the top side of the paper web (3) and some of the printers (10, 10') are arranged to pattern the bottom side of the paper web (3). 10
21. An apparatus as claimed in any one of claims 10 to 20. **characterized** in that the patterning unit (1) is arranged to pattern the paper web (3) with a pattern which continuously repeats as such 15
22. An apparatus as claimed in any one of claims 10 to 20. **characterized** in that the patterning unit (4) is arranged to pattern the paper web (3) with patterns differing from each other. 20

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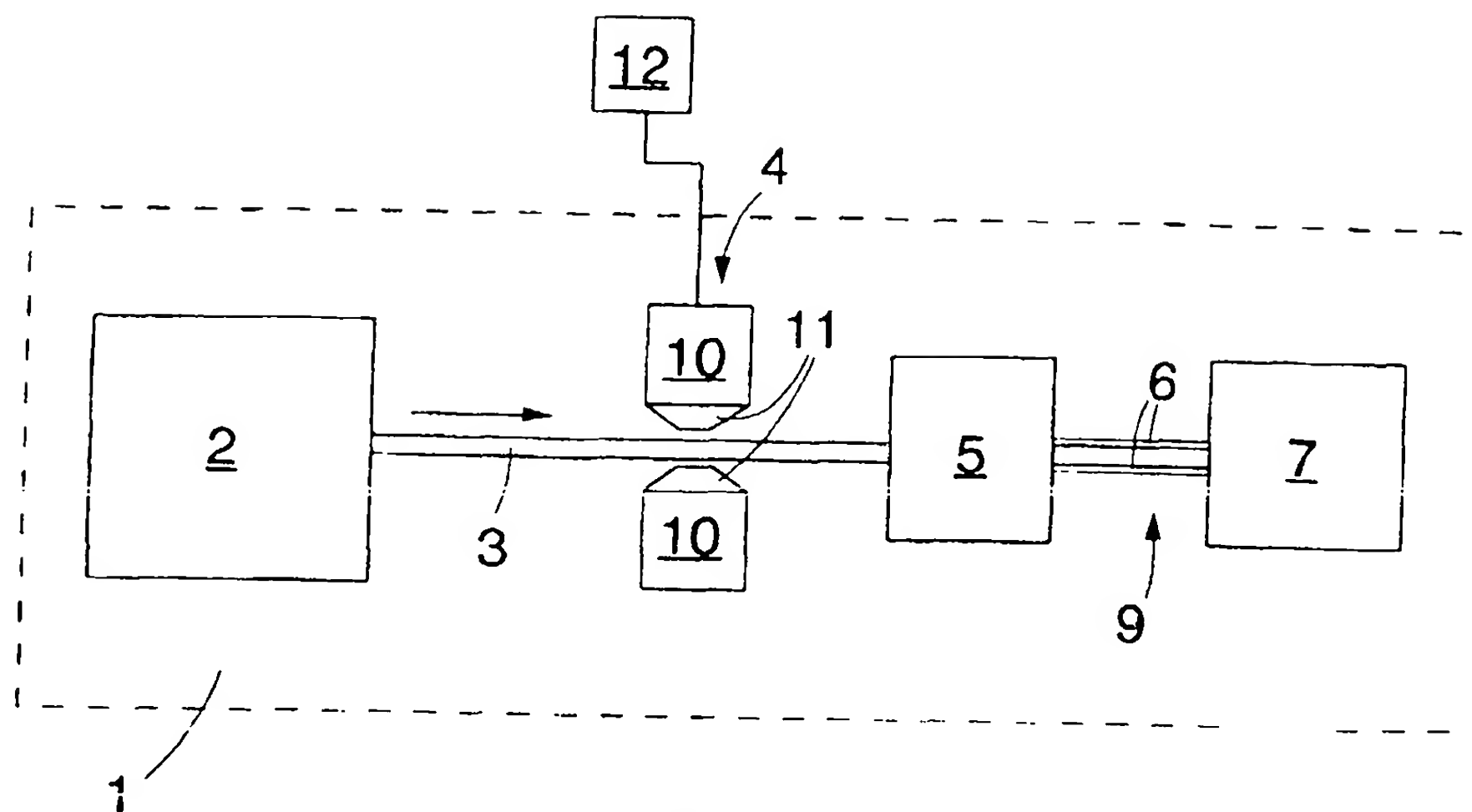


FIG. 1

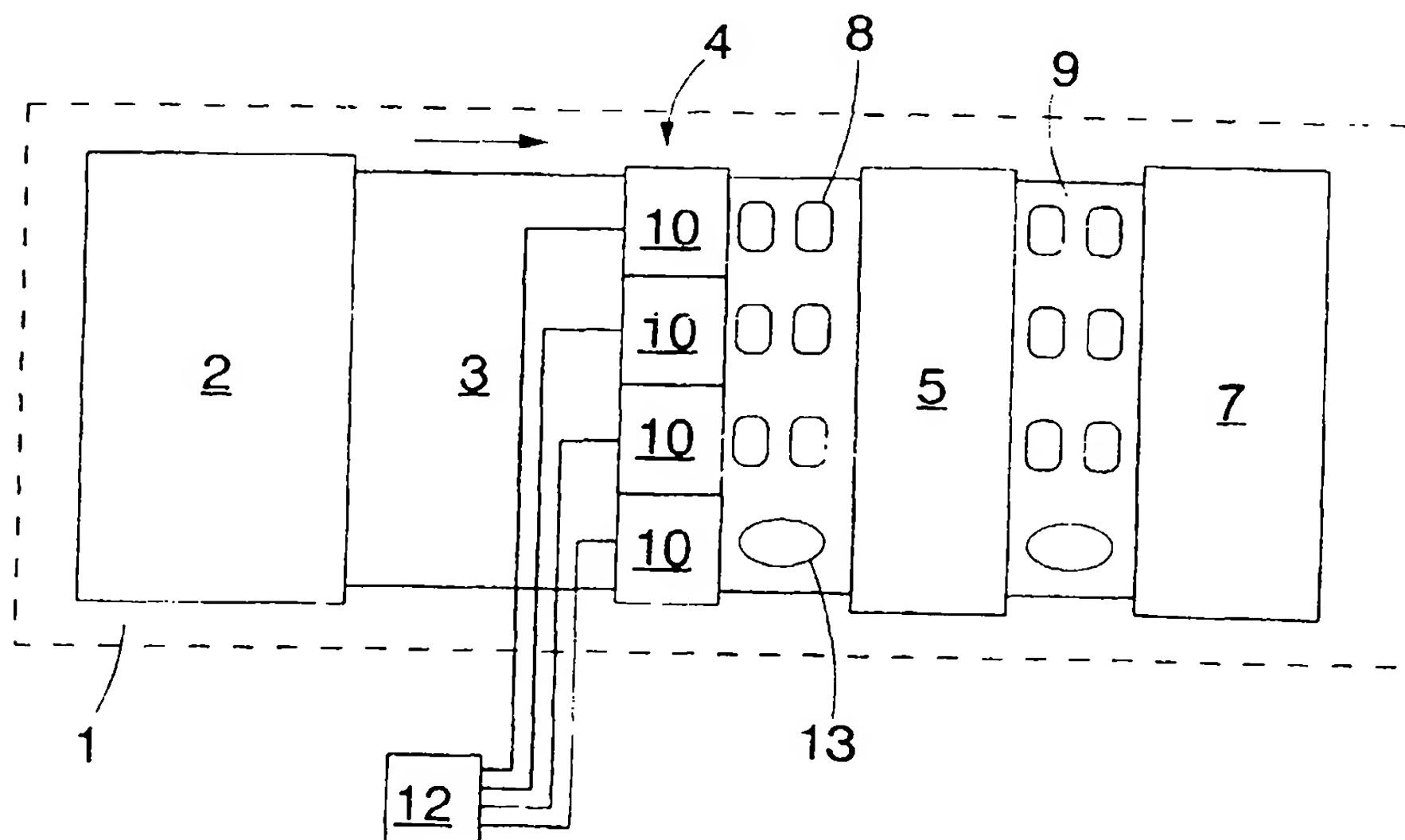


FIG. 2

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(72) Inventor: **Talja, Martti**  
35800 Mänttä (FI)

(74) Representative: **Kaukonen, Juha Veikko**  
Kolster Oy Ab,  
Iso Roobertinkatu 23  
00120 Helsinki (FI)

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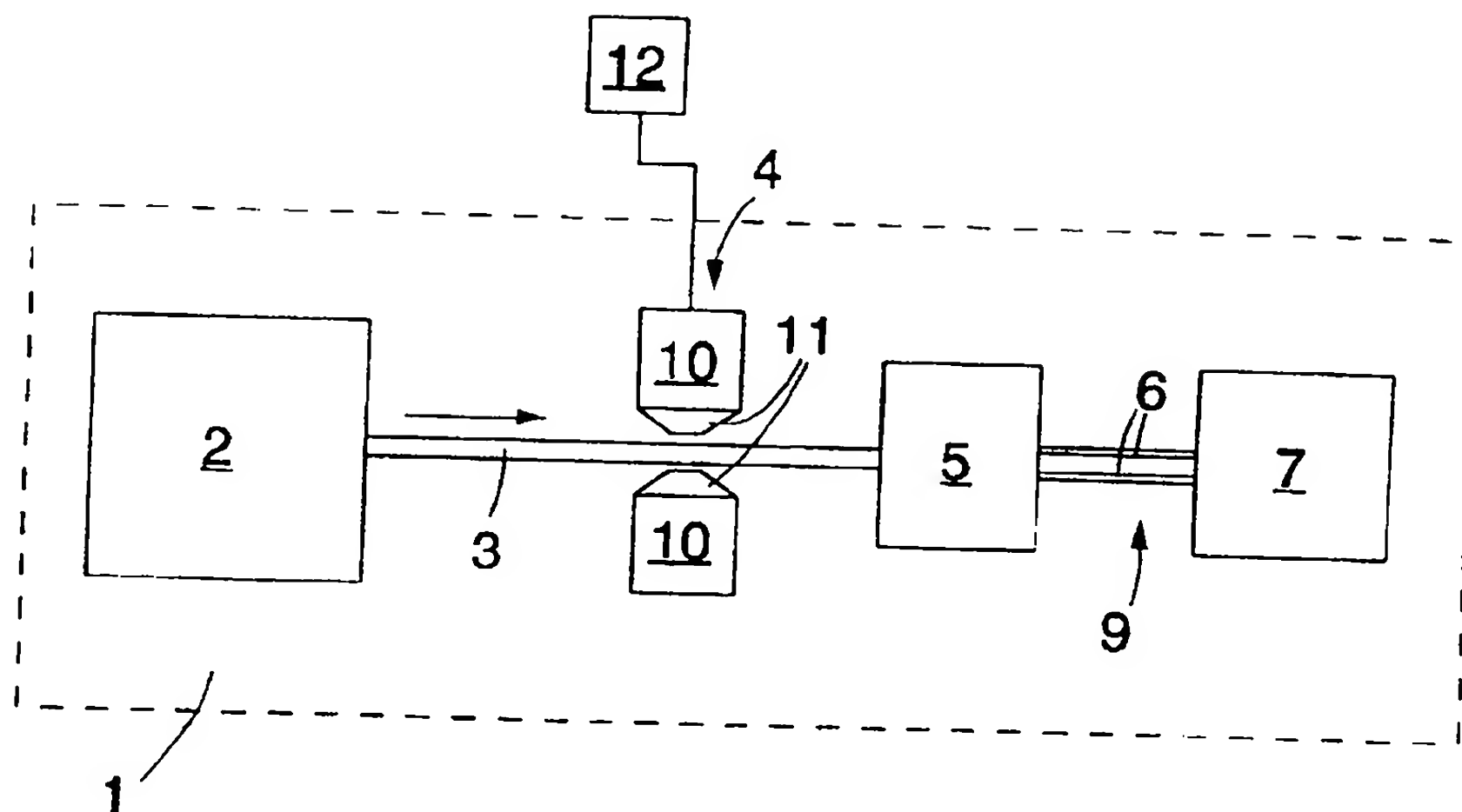


FIG. 1

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 66 0108

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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13-02-2001

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GB 2220346 A	10-01-1990	NONE	

EP 00 66 0108

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82



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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 66 0108

## DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 504 357 A (LEIDERER PAUL ET AL) 12 March 1985 (1985-03-12)  * abstract * * column 5, line 55 - column 7, line 25: figures 5-7 *	1-4, 8-13, 18, 21, 22	D21F11/00
A	GB 2 220 346 A (W D PERKINS LIMITED) 10 January 1990 (1990-01-10) * abstract *	5, 6, 14, 15	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D21F
The present search report has been drawn up for all claims			

Place of search  
THE HAGUE

Date of completion of the search  
13 February 2001

Examiner  
Helpiö, T.

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- Y particularly relevant if combined with another document of the same category
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